



3-D Paper Mechanisms

Pop-ups are 3D mechanisms made from paper. People who design pop-ups professionally are called paper engineers. Many students have already seen pop-up books and cards and are intrigued by the motions they can produce; how they can make a story come alive. This unit uses pop-ups to integrate engineering, science, math, art and literacy.

Students investigate how commercially made pop-ups are constructed and then try to create their own. They do a series of experiments that reveal the mathematical relationships that allow pop-ups to open and close. Math topics include measurement, data collection, identifying patterns in data, representation, algebra, geometry, and generalization. Compound pop-ups, which incorporate more than one pop-up in the same card, become the basis for introducing systems concepts. Students learn to distinguish different paths of motion and relate them to the way a pop-up was constructed.

Many of the students' pop-ups will not work correctly, so in the course of the activities, students develop facility in troubleshooting and redesign as well as resiliency. By the end of the unit, they unravel the secrets of professional paper engineers, and use paper engineering principles to create their own complex pop-ups. The video below shows some of the constructions students learn to make.

Gary Benenson, et.al.
City Technology Website,
<http://citytechnology.org>

The pop-up curriculum unit and correlations to state science standards, state mathematics standards, and national standards can be downloaded at the City Technology website.

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